Nota Lepi. **38**(1) 2015: 29–45 | DOI 10.3897/nl.38.8814

Contribution to the knowledge of the butterfly fauna of Albania

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http://zoobank.org/7FACABAA-FABE-484C-8C4A-E6573BCB55E1

Received 24 October 2014; accepted 18 February 2015; published: 4 March 2015
Subject Editor: Zdenek Fric.

Abstract. Albanian insect fauna is one of the least studied in Europe. In 2012 and 2013 surveys were undertaken with the aim of improving the knowledge of the distribution of butterflies, particularly in the southern part of the country. This research has resulted in the publication of three new species records for Albania. Here we add two new species to the list of native butterflies of Albania, *Melitaea ornata* Christoph, 1893 and *Cupido alcetas* (Hoffmannsegg, 1804). We recorded a total of 143 species including several confirmations of historical published records.

The total number of species has consequently increased to 198, which is comparable with butterfly diversity in neighbouring countries. Unlike its neighbours, Albania has preserved many of its traditional agricultural practices and consequently its rich fauna has been well protected during the last decades. However, with the opening up of the country to outside influences this will undoubtedly change as the process of intensification has already started in more populated coastal areas. It is therefore imperative to identify important butterfly areas in need of conservation and to take decisive measures to preserve traditional agricultural practices.

Introduction

Albania is a European country in the south-eastern Mediterranean region. Its total area is 28,748 km^2, with 28.5% of its surface area exceeding 1000 m in altitude making it one of the most mountainous countries in Europe. It has diverse landscapes, ranging from high mountains in the north and east to an extensive coastline in the west. The climate benefits from both Mediterranean and Central European influences, with mean January temperatures ranging between –3° to 10°C and mean July temperatures varying between 17° to 25°C. Rainfall ranges from 600 mm to over

3000 mm in high mountain areas (Weatheronline 2014). Albania is in the contact zone between Central European and Mediterranean fauna and is a part of the Mediterranean biodiversity 'hotspot' (Cuttelod et al. 2008) with exceptionally rich fauna and flora (MMPAU 2007; Radford et al. 2011). A recent revision of the butterfly fauna of Albania resulted in an updated checklist of 196 species (Verovnik and Popović 2013a), and with possible additional species to be discovered it is one of the richest butterfly countries in Europe.

Lack of interest in butterflies by the local community, inadequate funding and political isolation during Communist times has left the butterfly fauna of Albania amongst the least studied in the Balkans. Southern Albania in particular has never been extensively studied and only the accounts of a few scientific surveys have been published (Gaskin 1990; Abadjiev and Beshkov 1996a; Abadjiev and Beshkov 1996b; Misja 2005; Verovnik and Popović 2013b; Cuvelier and Mølgaard 2015). This paper provides additional information on the distribution of butterflies in Albania, listing and discussing the species that have been recorded during the last two years of field surveys. It is a continuation of a recent initiative to increase the knowledge of butterfly diversity and distribution in Albania providing a platform for further butterfly research in this country (Verovnik and Popović 2013a, 2013b). A comparison of Albanian fauna with its neighboring countries is presented, and the threats, as a result of the transition from traditional to modern agricultural practices, are discussed.

Methods

The surveys of butterfly fauna, carried out by several groups of researchers, started in July 2012 and continued in 2013. Butterflies were observed, photographed and identified in the field, with only a few specimens collected for further study and identification. Butterfly identification was based on Tolman and Lewington (2008) and Lafranchis (2004). Additionally, *Pieris balcana* Lorković, 1970 was identified consulting the website of Ziegler (2013), and *Melitaea ornata* Christoph, 1893 was confirmed using DNA barcoding gene COI (Verovnik, unpublished data). Male genitalia measurements were taken only from collected specimens of *Leptidea sinapis* (Linnaeus, 1758) (Hubrechts 2013; Maes, unpublished data). Taxonomy and nomenclature follow van Swaay et al. (2010) and/or Fauna Europaea.

We compared the number of species observed in Albania to the number of species observed in neighbouring countries. The total number of species in Albania was compiled from all available data, excluding species that are not native to the region (sensu IUCN 2012). The number of species observed in neighbouring countries is in accordance with the Red List of European Butterflies (van Swaay et al. 2010).

The study took place in five southern Albanian counties (Korçë, Elbasan, Gjirokastër, Fier and Berat) concentrating mainly on the mountain regions of Mali i Moravës, Gramoz (Mali i Gramozit), Ostrovicë, Devoll River Gorge, Mt. Tomorri and on Mt. Nemërçkë near Gjirokastër. In total 68 localities were visited, but these were subsequently grouped into 30 larger locations (Fig. 1):

1. Ohrid lake, close to the Village of Urahë (41°03'45"N; 20°37'28"E; 811 m). Road verges, rocky slopes with shrubs.
2. Korçë, Drenovë, gorge NE of the village (40°35'19"N; 20°48'25"E; 1075 m). Dry rocky slopes with limited vegetation cover.

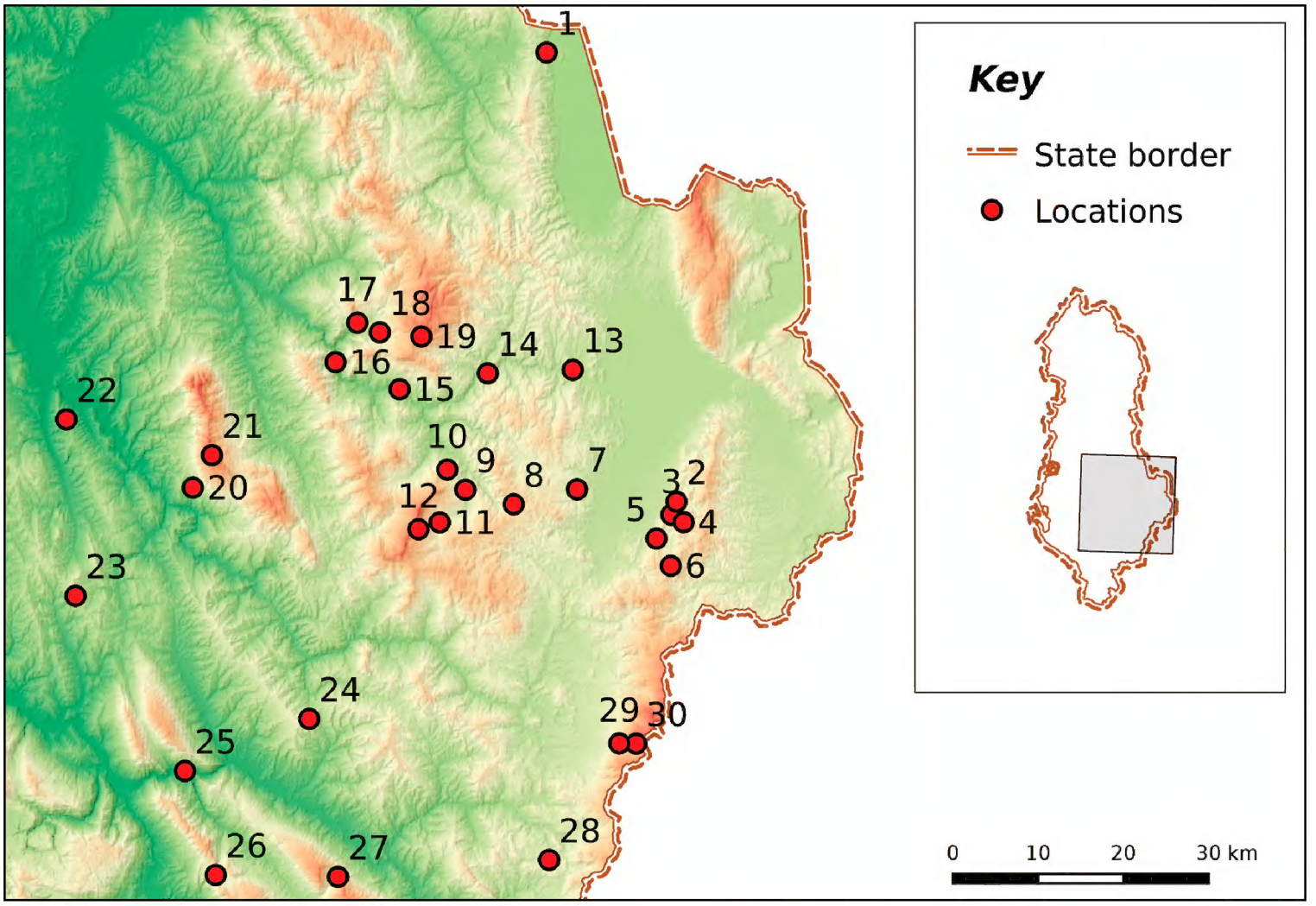

Figure 1. Map of Albania with the position of study locations.

3. Korçë, Drenovë, gorge SE of the village (40°34'29"N; 20°47'59"E; 1075 m). Dry rocky slopes with limited vegetation cover.
4. Korçë, Drenovë, Parku Kombëtar Bredhi i Drenovës, SE of the village (40°34'01"N; 20°49'00"E; 1170 m). Forests and forest clearings close to a stream and open, rocky habitats in the lower parts of the valley.
5. Korçë, Boboshtiçë, valleys and gorges E of the village (40°32'59"N; 20°46'45"E; 1040 m). Dry rocky slopes with limited vegetation cover.
6. Korçë, Boboshtiçë, on the road to Dardhë (40°31'15"N; 20°47'57"E; 1565 m). Forests, forest clearings and meadows close to the main road.
7. Korçë, Lavdar, in the valley E of the village (40°36'05"N; 20°40'08"E; 992 m). Open, rocky habitats with limited shrubs and trees, meadows.
8. Voskopojë, Gjergjevicë, small gorge on the road E of the village (40°35'07"N; 20°34'53"E; 1269 m). Dry rocky slopes with shrubs and grasses.
9. Voskopojë, Lekas Village (40°36'01''N; 20°30'52"E; 991 m). Dry rocky slopes with shrubs and trees, meadows.
10. Voskopojë, along the road NW of the Village of Tudis (40°37'18"N; 20°29'21"E; 1204 m). Dry rocky slopes with shrubs and trees, meadows.
11. Voskopojë, along the road SW of the Village of Marjan (40°33'57"N; 20°28'45"E; 1225 m). Flowery meadows with shrubs and trees.
12. Voskopojë, Mali i Ostroviçës (40°33'30"N; 20°26'59"E; 1231 m). Flowery meadows on slopes.

13. Devoll Gorge, W of the small town of Maliq, before the gorge (40°43'39"N; 20°39'45"E; 825 m). Dry rocky habitats with limited vegetation cover.
14. Devoll Gorge, along the road E of the Village of Strelcë (40°43'24"N; 20°32'40"E; 689 m). Dry rocky slopes with limited vegetation cover.
15. Devoll Gorge, on the road Gjinkas-Moglicë (40°42'22"N; 20°25'20"E; 508 m). Dry rocky slopes with limited vegetation cover on calcareous terrain.
16. Devoll Gorge, on the road Moglicë-Bratilë (40°44'03"N; 20°19'59"E; 385 m). Dry rocky slopes with limited vegetation cover.
17. Gramsh, Grabove e Posthme, in the gorge below the village (40°46'33"N; 20°21'47"E; 880 m). Dry rocky slopes with limited vegetation cover, overgrown slopes.
18. Gramsh, Lenie, in the village and along the stream below (40°45'57"N; 20°23'40"E; 992 m). Orchards, overgrown gravel stream beds.
19. Gramsh, Maja e Valamarës, on the ridge S of the summit (40°45'43"N; 20°27'07"E; 2088 m). High mountain grasslands (some parts intensively grazed), forest fragments and rocky terrain.
20. Berat, Mali i Tomorrit foothills, E of the Village of Poliçan (40°36'01"N; 20°08'13"E; 662 m). Dry rocky slopes with shrubs and trees.
21. Berat, Mali i Tomorrit, south facing slopes below the mountain ridge (40°38'06"N; 20°09'46"E; 2339 m). Alpine scree slopes with limited grass cover.
22. Berat, Drobonik, along the road S of the village (40°40'16"N; 19°57'38"E; 416 m). Open woodlands.
23. Berat, Gllavë (40°29'05"N; 19°58'34"E; 909 m). Dry rocky slopes with shrubs and trees.
24. Permet, Bejkollare (40°21'26"N; 20°18'02"E; 926 m). Dry rocky slopes with shrubs and trees, meadows.
25. Tepelene, at the entrance of the gorge, close to the Village of Kelcyre (40°18'04"N; 20°07'47"E; 261 m). Dry, calcareous terrains, ruderal areas.
26. Gjirokaster, Cajupi (40°11'31"N; 20°10'25"E; 1387 m). Dry, calcareous terrains partially covered with low shrubs, pastures.
27. Gjirokaster, Sheper ridge (40°11'27"N; 20°20'30"E; 1698 m). Dry, mountain grasslands, rocky slopes.
28. Ersekë, along the road from Leskovik to Ersekë (40°12'36"N; 20°37'57"E; 1098 m). Dry flowery meadows.
29. Ersekë, Rehove, lower slopes of Gramoz Mts. above the village (40°20'00"N; 20°43'43"E; 1547 m). Grasslands, rocky terrains and pastures.
30. Ersekë, Rehove, at the ridge of the Gramoz Mts. (40°19'59"N; 20°45'7"E; 2147 m). High mountain grasslands, pastures and rocky terrain.

Results

During our field surveys in Albania, we recorded a total of 143 butterfly species, from 66 genera and 5 families. Overall it is a total of 1415 records from 68 locations. *Cupido alcetas* (Hoffmannsegg, 1804) and *Melitaea ornata* were recorded for the first time in Albania. A single male specimen of *C. alcetas* was observed in the vicinity of Lavdar Village, in dense grassland

close to the forest edge. A single worn female of *M. ornata* was collected above the gorge SE of Drenovë Village.

The list of recorded species from southern Albania with localities depicted as numerals from the methods section and observation dates in brackets following each locality:

Family Hesperiidae

1. *Pyrgus armoricanus* (Oberthür, 1910) Observations: 16 (22.vii.2013)
2. *Pyrgus serratulae* (Rambur, 1839) Observations: 27 (25.vii.2013), 29 (12.vii.2012)
3. *Pyrgus cinarae* (Rambur, 1839) Observations: 6 (11.vii.2012), 26 (24.vii.2013), 27 (25. vii.2013)
4. *Spialia orbifer* (Hübner, 1823) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012), 6 (11.vii.2012), 7 (21.vii.2013), 8 (17.vii.2013), 10 (17.vii.2013), 11 (19. vii.2013), 12 (19.vii.2013), 15 (22.vii.2013), 16 (23.vii.2013), 22 (22.vii.2013), 27 (25. vii.2013)
5. *Spialia phlomidis* (Herrich-Schäffer, 1845) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 15 (22.vii.2013)
6. *Muschampia proto* (Ochsenheimer, 1808) Observations: 25 (24.vii.2013)
7. *Carcharodus alceae* (Esper, 1780) Observations: 3 (21.vii.2013), 4 (21.vii.2013), 5 (11. vii.2012), 15 (22.vii.2013), 16 (22.vii.2013), 25 (24.vii.2013), 26 (24.vii.2013), 27 (25. vii.2013)
8. *Carcharodus lavatherae* (Esper, 1783) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 5 (11. vii.2012)
9. *Carcharodus floccifera* (Zeller, 1847) Observations: 4 (21.vii.2013), 12 (19.vii.2013), 27 (25.vii.2013), 30 (12.vii.2012)
10. *Carcharodus orientalis* Reverdin, 1913. Observations: 5 (11.vii.2012), 20 (21.vii.2013), 21 (21.vii.2013)
11. *Erynnis tages* (Linnaeus, 1758) Observations: 3 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012, 18.vii.2013), 7 (21.vii.2013), 10 (17.vii.2013), 12 (19.vii.2013), 15 (22.vii.2013), 16 (22. vii.2013, 23.vii.2013), 17 (23.vii.2013), 24 (20.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013)
12. *Erynnis marloyi* (Boisduval, 1834) Observations: 23 (22.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013)
13. *Thymelicus acteon* (Rottemburg, 1775) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012), 6 (11.vii.2012), 14 (10.vii.2012), 22 (22.vii.2013), 23 (22. vii.2013), 24 (20.vii.2013)
14. *Thymelicus lineola* (Ochsenheimer, 1808) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 4 (21.vii.2013), 5 (15.vii.2013, 16.vii.2013), 6 (11.vii.2012), 7 (21.vii.2013), 11 (19. vii.2013), 15 (10.vii.2012), 27 (25.vii.2013), 29 (12.vii.2012)
15. *Thymelicus sylvestris* (Poda, 1761) Observations: 2 (21.vii.2013), 5 (11.vii.2012), 6 (11. vii.2012), 8 (17.vii.2013), 9 (17.vii.2013), 10 (17.vii.2013), 14 (10.vii.2012), 16 (23. vii.2013), 21 (21.vii.2013)
16. *Hesperia comma* (Linnaeus, 1758) Observations: 27 (25.vii.2013)
17. *Ochlodes sylvanus* (Esper, 1777) Observations: 2 (21.vii.2013), 4 (21.vii.2013), 5 (11. vii.2012), 6 (11.vii.2012), 11 (19.vii.2013), 13 (10.vii.2012)

Family Papilionidae

18. *Parnassius apollo* (Linnaeus, 1758) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 5 (11.vii.2012, 15.vii.2013, 16.vii.2013, 18.vii.2013), 6 (11.vii.2012), 8 (17.vii.2013, 18.vii.2013), 12 (19.vii.2013), 16 (22.vii.2013), 19 (23.vii.2013), 30 (12.vii.2012)
19. *Parnassius mnemosyne* (Linnaeus, 1758) Observations: 12 (19.vii.2013), 21 (21.vii.2013, 25.vii.2013), 30 (12.vii.2012)
20. *Papilio machaon* Linnaeus, 1758. Observations: 1 (15.vii.2013), 3 (21.vii.2013), 5 (11.vii.2012, 16.vii.2013), 7 (21.vii.2013), 8 (17.vii.2013), 14 (10.vii.2012, 22.vii.2013), 15 (22.vii.2013), 16 (22.vii.2013, 23.vii.2013), 17 (23.vii.2013), 20 (21.vii.2013), 21 (21.vii.2013, 25.vii.2013), 22 (22.vii.2013), 24 (20.vii.2013), 25 (24.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013), 28 (14.vii.2013), 29 (12.vii.2012)
21. *Iphiclides podalirius* (Linnaeus, 1758) Observations: 1 (15.vii.2013), 2 (21.vii.2013), 3 (21.vii.2013), 5 (11.vii.2012, 18.vii.2013), 6 (11.vii.2012), 7 (21.vii.2013), 9 (17.vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 13 (10.vii.2012), 14 (10.vii.2012, 22.vii.2013), 15 (10.vii.2012, 22.vii.2013), 16 (22.vii.2013, 23.vii.2013), 17 (23.vii.2013), 20 (21.vii.2013), 22 (22.vii.2013), 23 (22.vii.2013), 24 (20.vii.2013), 25 (24.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013), 28 (20.vii.2013), 29 (12.vii.2012)

Family Pieridae

22. *Aporia crataegi* (Linnaeus, 1758) Observations: 3 (21.vii.2013), 4 (21.vii.2013), 6 (11.vii.2012), 8 (17.vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 14 (10.vii.2012), 29 (12.vii.2012)
23. *Pieris rapae* (Linnaeus, 1758) Observations: 2 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012, 15.vii.2013), 6 (11.vii.2012), 7 (21.vii.2013),10 (17.vii.2013), 12 (19.vii.2013), 13 (10.vii.2012), 15 (10.vii.2012), 16 (22.vii.2013, 23.vii.2013), 18 (23.vii.2013), 19 (23.vii.2013), 22 (22.vii.2013), 23 (22.vii.2013), 24 (20.vii.2013), 25 (24.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013), 30 (12.vii.2012)
24. *Pieris mannii* (Mayer, 1851) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 6 (11.vii.2012), 10 (17.vii.2013), 12 (19.vii.2013), 14 (22.vii.2013), 15 (10.vii.2012), 16 (22.vii.2013, 23.vii.2013), 17 (23.vii.2013), 18 (23.vii.2013), 19 (23.vii.2013), 21 (25.vii.2013), 22 (22.vii.2013), 25 (24.vii.2013)
25. *Pieris ergane* (Geyer, 1828) Observations: 2 (21.vii.2013), 8 (17.vii.2013), 14 (22.vii.2013), 16 (23.vii.2013), 17 (23.vii.2013), 21 (21.vii.2013), 27 (25.vii.2013)
26. *Pieris balcana* Lorković, 1970. Observations: 6 (11.vii.2012)
27. *Pieris napi* (Linnaeus, 1758) Observations: 8 (18.vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 14 (22.vii.2013), 16 (23.vii.2013), 18 (23.vii.2013), 19 (23.vii.2013), 21 (21.vii.2013), 27 (25.vii.2013), 28 (20.vii.2013)
28. *Pontia edusa* (Fabricius, 1777) Observations: 3 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012), 6 (11.vii.2012), 9 (17.vii.2013), 10 (17.vii.2013), 13 (10.vii.2012), 14 (10.vii.2012), 15 (10.vii.2012, 22.vii.2013), 16 (22.vii.2013, 23.vii.2013), 22 (22.vii.2013), 25 (24.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013), 29 (12.vii.2012), 30 (12.vii.2012)
29. *Euchloe ausonia* (Hübner, 1804) Observations: 3 (21.vii.2013)
30. *Colias aurorina* (Herrich-Schäffer, 1850) Observations: 5 (11.vii.2012), 6 (11.vii.2012), 26 (24.vii.2013), 27 (25.vii.2013), 29 (12.vii.2012), 30 (12.vii.2012)

31. *Colias alfacariensis* Ribbe, 1905. Observations: 2 (21.vii.2013), 3 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012, 16.vii.2013, 18.vii.2013), 6 (11.vii.2012), 7 (21.vii.2013), 8 (17.vii.2013, 18.vii.2013), 9 (17.vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 13 (10.vii.2012), 14 (10.vii.2012, 22.vii.2013), 15 (10.vii.2012, 22.vii.2013), 17 (23.vii.2013), 20 (21.vii.2013), 24 (20.vii.2013), 27 (25.vii.2013), 28 (20.vii.2013), 29 (12.vii.2012), 30 (12.vii.2012)
32. *Colias croceus* (Fourcroy, 1785) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012, 15.vii.2013, 16.vii.2013,18.vii.2013), 6 (11.vii.2012), 7 (21.vii.2013), 8 (17.vii.2013, 18.vii.2013), 9 (17.vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 13 (10.vii.2012), 14 (10.vii.2012, 22.vii.2013), 15 (10.vii.2012, 22.vii.2013), 16 (22.vii.2013, 23.vii.2013), 17 (23.vii.2013), 18 (23.vii.2013), 19 (23.vii.2013), 20 (21.vii.2013), 21 (25.vii.2013), 22 (22.vii.2013), 23 (22.vii.2013), 24 (20.vii.2013), 25 (24.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013), 28 (20.vii.2013), 29 (12.vii.2012), 30 (12.vii.2012)
33. *Gonepteryx rhamni* (Linnaeus, 1758) Observations: 5 (11.vii.2012), 6 (11.vii.2012), 7 (21.vii.2013), 12 (19.vii.2013), 14 (22.vii.2013), 19 (23.vii.2013), 21 (25.vii.2013), 27 (25.vii.2013), 30 (12.vii.2012)
34. *Gonepteryx cleopatra* (Linnaeus, 1767) Observations: 27 (25.vii.2013)
35. *Gonepteryx farinosa* (Zeller, 1847) Observations: 26 (24.vii.2013)
36. *Leptidea sinapis* (Linnaeus, 1758) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012, 15.vii.2013, 16.vii.2013, 18.vii.2013), 6 (11.vii.2012), 7 (21.vii.2013), 8 (17.vii.2013, 18.vii.2013), 9 (17.vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 13 (10.vii.2012), 14 (10.vii.2012, 22.vii.2013), 15 (10.vii.2012, 22.vii.2013), 16 (22.vii.2013, 23.vii.2013), 17 (23.vii.2013), 18 (23.vii.2013), 20 (21.vii.2013), 22 (22.vii.2013), 23 (22.vii.2013), 24 (20.vii.2013), 25 (24.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013), 28 (20.vii.2013), 29 (12.vii.2012)
37. *Leptidea duponcheli* (Staudinger, 1871) Observations: 3 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012), 6 (11.vii.2012), 7 (21.vii.2013), 14 (10.vii.2012), 15 (10.vii.2012, 22.vii.2013)

Family Lycaenidae

38. *Thecla betulae* (Linnaeus, 1758) Observations: 16 (22.vii.2013, 23.vii.2013)
39. *Favonius quercus* (Linnaeus, 1758) Observations: 29 (12.vii.2012)
40. *Satyrium acaciae* (Fabricius, 1787) Observations: 4 (21.vii.2013), 5 (11.vii.2012), 6 (11.vii.2012), 11 (19.vii.2013), 15 (10.vii.2012), 29 (12.vii.2012)
41. *Satyrium ilicis* (Esper, 1779) Observations: 6 (11.vii.2012), 13 (10.vii.2012), 15 (10.vii.2012)
42. *Satyrium spini* (Denis & Schiffermüller, 1775) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 6 (11.vii.2012), 9 (17.vii.2013), 11 (19.vii.2013), 15 (10.vii.2012), 21 (25.vii.2013), 27 (25.vii.2013)
43. *Satyrium w-album* (Knoch, 1782) Observations: 6 (11.vii.2012), 9 (17.vii.2013)
44. *Callophrys rubi* (Linnaeus, 1758) Observations: 6 (11.vii.2012)
45. *Lycaena phlaeas* (Linnaeus, 1761) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012), 6 (11.vii.2012), 13 (10.vii.2012), 15 (10.vii.2012, 22.vii.2013), 16 (22.vii.2013), 21 (21.vii.2013), 25 (24.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013)

46. *Lycaena dispar* (Haworth, 1802) Observations: 5 (11.vii.2012)
47. *Lycaena virgaureae* (Linnaeus, 1758) Observations: 6 (11.vii.2012), 12 (19.vii.2013), 21 (25.vii.2013), 29 (12.vii.2012)
48. *Lycaena tityrus* (Poda, 1761) Observations: 2 (21.vii.2013), 5 (11.vii.2012), 12 (19. vii.2013), 16 (22.vii.2013), 29 (12.vii.2012)
49. *Lycaena alciphron* (Rottemburg, 1775) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012), 6 (11.vii.2012), 12 (19.vii.2013), 14 (10.vii.2012)
50. *Lycaena thersamon* (Esper, 1784) Observations: 6 (11.vii.2012), 14 (10.vii.2012), 15 (10. vii.2012)
51. *Lycaena candens* (Herrich-Schäffer, 1844) Observations: 30 (12.vii.2012)
52. *Lampides boeticus* (Linnaeus, 1767) Observations: 14 (10.vii.2012), 27 (25.vii.2013)
53. *Leptotes pirithous* (Linnaeus, 1767) Observations: 5 (11.vii.2012), 7 (21.vii.2013), 15 (10. vii.2012), 24 (20.vii.2013)
54. *Tarucus balkanica* (Freyer, 1844) Observations: 25 (24.vii.2013)
55. *Cupido minimus* (Fuessly, 1775) Observations: 2 (21.vii.2013), 4 (21.vii.2013), 5 (15. vii.2013, 16.vii.2013), 6 (11.vii.2012), 11 (19.vii.2013), 12 (19.vii.2013), 19 (23.vii.2013), 27 (25.vii.2013)
56. *Cupido osiris* (Meigen, 1829) Observations: 7 (21.vii.2013), 13 (10.vii.2012), 14 (10. vii.2012)
57. *Cupido alcetas* (Hoffmannsegg, 1804) Observations: 7 (21.vii.2013)
58. *Celastrina argiolus* (Linnaeus, 1758) Observations: 3 (21.vii.2013), 4 (21.vii.2013), 5 (15.vii.2013), 6 (11.vii.2012), 7 (21.vii.2013), 10 (17.vii.2013), 14 (10.vii.2012), 15 (10. vii.2012), 17 (23.vii.2013), 18 (23.vii.2013), 25 (24.vii.2013), 26 (24.vii.2013)
59. *Phengaris alcon* (Denis & Schiffermüller, 1775) Observations: 6 (11.vii.2012), 27 (25. vii.2013)
60. *Phengaris arion* (Linnaeus, 1758) Observations: 4 (21.vii.2013), 6 (11.vii.2012)
61. *Iolana iolas* (Ochsenheimer, 1816) Observations: 6 (11.vii.2012), 7 (21.vii.2013), 14 (10. vii.2012), 27 (8-19.vii.2013)
62. *Scolitantides orion* (Pallas, 1771) Observations: 16 (23.vii.2013)
63. *Pseudophilotes vicrama* (Moore, 1865) Observations: 3 (21.vii.2013), 5 (11.vii.2012), 6 (11.vii.2012), 8 (18.vii.2013), 10 (17.vii.2013), 15 (10.vii.2012), 27 (25.vii.2013)
64. *Plebejus sephirus* (Frivaldzky, 1835) Observations: 27 (25.vii.2013)
65. *Plebejus argus* (Linnaeus, 1758) Observations: 5 (11.vii.2012, 16.vii.2013), 10 (17. vii.2013), 11 (19.vii.2013), 13 (10.vii.2012), 14 (10.vii.2012), 15 (10.vii.2012), 23 (22. vii.2013), 24 (20.vii.2013), 28 (20.vii.2013)
66. *Plebejus idas* (Linnaeus, 1761) Observations: 2 (21.vii.2013), 4 (21.vii.2013), 6 (11. vii.2012), 7 (21.vii.2013), 8 (17.vii.2013), 16 (22.vii.2013), 18 (23.vii.2013), 23 (22. vii.2013), 27 (25.vii.2013), 29 (12.vii.2012)
67. *Aricia eumedon* (Esper, 1780) Observations: 12 (19.vii.2013)
68. *Aricia agestis* (Denis & Schiffermüller, 1775) Observations: 2 (21.vii.2013), 3 (21. vii.2013), 4 (21.vii.2013), 5 (11.vii.2012, 18.vii.2013), 6 (11.vii.2012), 7 (21.vii.2013), 12 (19.vii.2013), 13 (10.vii.2012), 14 (10.vii.2012), 15 (10.vii.2012, 22.vii.2013), 16 (22.vii.2013, 23.vii.2013), 18 (23.vii.2013), 22 (22.vii.2013), 23 (22.vii.2013), 24 (20. vii.2013), 25 (24.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013), 29 (12.vii.2012)

69. *Aricia artaxerxes* (Fabricius, 1793) Observations: 5 (16.vii.2013), 6 (11.vii.2012), 21 (25.vii.2013)
70. *Aricia anteros* (Freyer, 1838) Observations: 12 (19.vii.2013)
71. *Cyaniris semiargus* (Rottemburg, 1775) Observations: 4 (21.vii.2013), 5 (11.vii.2012), 6 (11.vii.2012), 11 (19.vii.2013), 12 (19.vii.2013), 16 (23.vii.2013), 30 (12.vii.2012)
72. *Polyommatus damon* (Denis & Schiffermüller, 1775) Observations: 8 (17.vii.2013), 12 (19.vii.2013)
73. *Polyommatus ripartii* (Freyer, 1830) Observations: 3 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012, 16.vii.2013), 6 (11.vii.2012), 7 (21.vii.2013), 8 (17.vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 15 (22.vii.2013), 27 (25.vii.2013)
74. *Polyommatus admetus* (Esper, 1783) Observations: 2 (21.vii.2013), 3 (21.vii.2013),4 (21.vii.2013), 5 (11.vii.2012, 18.vii.2013), 7 (21.vii.2013), 10 (17.vii.2013), 14 (10.vii.2012, 22.vii.2013), 15 (22.vii.2013), 18 (23.vii.2013), 23 (22.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013), 29 (12.vii.2012)
75. *Polyommatus escheri* (Hübner, 1823) Observations: 9 (17.vii.2013), 10 (17.vii.2013), 14 (10.vii.2012, 22.vii.2013), 15 (22.vii.2013), 16 (22.vii.2013), 28 (20.vii.2013)
76. *Polyommatus amandus* (Schneider, 1792) Observations: 5 (11.vii.2012), 6 (11.vii.2012), 12 (19.vii.2013), 14 (10.vii.2012)
77. *Polyommatus thersites* (Cantener, 1835) Observations: 3 (21.vii.2013), 4 (21.vii.2013), 9 (17.vii.2013), 15 (10.vii.2012), 23 (22.vii.2013), 27 (25.vii.2013), 29 (12.vii.2012)
78. *Polyommatus dorylas* (Denis & Schiffermüller, 1775) Observations: 3 (21.vii.2013), 4 (21.vii.2013), 6 (11.vii.2012), 16 (23.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013)
79. *Polyommatus daphnis* (Denis & Schiffermüller, 1775) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012), 6 (11.vii.2012), 7 (21.vii.2013), 9 (17.vii.2013), 11 (19.vii.2013), 14 (10.vii.2012), 15 (10.vii.2012, 22.vii.2013), 16 (22.vii.2013), 20 (21.vii.2013), 24 (20.vii.2013), 27 (25.vii.2013), 28 (20.vii.2013)
80. *Polyommatus coridon* (Poda, 1761) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012), 7 (21.vii.2013), 9 (17.vii.2013), 16 (23.vii.2013), 26 (24.vii.2013)
81. *Polyommatus bellargus* (Rottemburg, 1775) Observations: 4 (21.vii.2013), 5 (11.vii.2012), 12 (19.vii.2013), 14 (10.vii.2012), 15 (10.vii.2012, 22.vii.2013), 16 (23.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013), 28 (20.vii.2013)
82. *Polyommatus icarus* (Rottemburg, 1775) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012, 15.vii.2013, 16.vii.2013, 18.vii.2013), 6 (11.vii.2012), 7 (21.vii.2013), 8 (17.vii.2013), 9 (17.vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 12 (19.vii.2013), 13 (10.vii.2012), 14 (10.vii.2012, 22.vii.2013), 15 (10.vii.2012, 22.vii.2013), 16 (22.vii.2013, 23.vii.2013), 17 (23.vii.2013), 18 (23.vii.2013), 19 (23.vii.2013), 20 (21.vii.2013), 21 (21.vii.2013, 25.vii.2013), 22 (22.vii.2013), 23 (22.vii.2013), 24 (20.vii.2013), 25 (24.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013), 28 (20.vii.2013), 29 (12.vii.2012), 30 (12.vii.2012)
83. *Polyommatus eros* (Ochsenheimer, 1808) Observations: 30 (12.vii.2012)

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84. *Libythea celtis* (Laicharting, 1782) Observations: 21 (25.vii.2013), 26 (24.vii.2013)
85. *Apatura iris* (Linnaeus, 1758) Observations: 6 (11.vii.2012), 8 (18.vii.2013)

86. *Apatura ilia* (Denis & Schiffermüller, 1775) Observations: 13 (10.vii.2012)
87. *Limenitis reducta* (Staudinger, 1901) Observations: 4 (21.vii.2013), 6 (11.vii.2012),8 (17. vii.2013), 11 (19.vii.2013), 14 (22.vii.2013), 24 (20.vii.2013),26 (24.vii.2013), 27 (25.vii.2013)
88. *Nymphalis antiopa* (Linnaeus, 1758) Observations: 11 (19.vii.2013), 21 (25.vii.2013)
89. *Nymphalis polychloros* (Linnaeus, 1758) Observations: 11 (19.vii.2013)
90. *Aglais io* (Linnaeus, 1758) Observations: 4 (21.vii.2013), 6 (11.vii.2012), 12 (19.vii.2013), 14 (10.vii.2012), 19 (23.vii.2013), 21 (21.vii.2013, 25.vii.2013)
91. *Aglais urticae* (Linnaeus, 1758) Observations: 6 (11.vii.2012), 12 (19.vii.2013), 19 (23. vii.2013), 21 (21.vii.2013, 25.vii.2013), 30 (12.vii.2012)
92. *Vanessa atalanta* (Linnaeus, 1758) Observations: 11 (19.vii.2013), 14 (10.vii.2012), 18 (23.vii.2013), 21 (25.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013), 30 (12.vii.2012)
93. *Vanessa cardui* (Linnaeus, 1758) Observations: 2 (21.vii.2013), 4 (21.vii.2013), 5 (11. vii.2012, 15.vii.2013, 16.vii.2013, 18.vii.2013), 6 (11.vii.2012), 7 (21.vii.2013), 8 (17. vii.2013, 18.vii.2013), 9 (17.vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 12 (19.vii.2013), 13 (10.vii.2012), 14 (10.vii.2012), 18 (23.vii.2013), 19 (23.vii.2013), 20 (21.vii.2013), 21 (21.vii.2013, 25.vii.2013), 22 (22.vii.2013), 23 (22.vii.2013), 24 (20.vii.2013), 26 (24. vii.2013), 27 (25.vii.2013), 28 (20.vii.2013), 29 (12.vii.2012)
94. *Issoria lathonia* (Linnaeus, 1758) Observations: 3 (21.vii.2013), 4 (21.vii.2013), 5 (11. vii.2012), 6 (11.vii.2012), 10 (17.vii.2013), 11 (19.vii.2013), 14 (10.vii.2012), 18 (23. vii.2013), 19 (23.vii.2013), 21 (21.vii.2013, 25.vii.2013), 26 (24.vii.2013), 27 (25. vii.2013), 29 (12.vii.2012), 30 (12.vii.2012)
95. *Polygonia c-album* (Linnaeus, 1758) Observations: 4 (21.vii.2013), 6 (11.vii.2012), 7 (21. vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 15 (22.vii.2013), 17 (23.vii.2013), 18 (23. vii.2013), 26 (24.vii.2013), 27 (25.vii.2013)
96. *Argynnis pandora* (Denis & Schiffermüller, 1775) Observations: 2 (21.vii.2013), 6 (11. vii.2012), 14 (10.vii.2012), 21 (25.vii.2013), 29 (12.vii.2012)
97. *Argynnis paphia* (Linnaeus, 1758) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 4 (21. vii.2013), 5 (18.vii.2013), 6 (11.vii.2012), 7 (21.vii.2013), 8 (17.vii.2013), 14 (10.vii.2012), 15 (10.vii.2012), 16 (23.vii.2013), 24 (20.vii.2013), 27 (25.vii.2013), 28 (20.vii.2013)
98. *Argynnis aglaja* (Linnaeus, 1758) Observations: 4 (21.vii.2013), 6 (11.vii.2012), 9 (17. vii.2013), 10 (17.vii.2013), 12 (19.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013)
99. *Argynnis adippe* (Denis & Schiffermüller, 1775) Observations: 4 (21.vii.2013), 6 (11. vii.2012), 9 (17.vii.2013), 10 (17.vii.2013), 15 (10.vii.2012)
100. *Argynnis niobe* (Linnaeus, 1758) Observations: 4 (21.vii.2013), 6 (11.vii.2012), 12 (19. vii.2013), 19 (23.vii.2013), 24 (20.vii.2013), 27 (25.vii.2013)
101. *Brenthis hecate* (Denis & Schiffermüller, 1775) Observations: 5 (16.vii.2013)
102. *Brenthis daphne* (Bergsträsser, 1780) Observations: 4 (21.vii.2013), 5 (11.vii.2012), 6 (11.vii.2012), 14 (10.vii.2012)
103. *Boloria graeca* (Staudinger, 1870) Observations: 30 (12.vii.2012)
104. *Boloria euphrosyne* (Linnaeus, 1758) Observations: 19 (23.vii.2013)
105. *Boloria dia* (Linnaeus, 1767) Observations: 2 (21.vii.2013), 5 (11.vii.2012)
106. *Melitaea phoebe* (Denis & Schiffermüller, 1775) Observations: 2 (21.vii.2013), 4 (21. vii.2013), 5 (11.vii.2012), 6 (11.vii.2012), 8 (17.vii.2013), 10 (17.vii.2013), 11 (19.

vii.2013), 14 (10.vii.2012), 19 (23.vii.2013), 22 (22.vii.2013), 25 (24.vii.2013), 29 (12. vii.2012)

107. *Melitaea didyma* (Esper, 1779) Observations: 3 (21.vii.2013), 4 (21.vii.2013), 6 (11. vii.2012), 8 (17.vii.2013), 9 (17.vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 15 (10. vii.2012), 21 (21.vii.2013), 25 (24.vii.2013), 26 (24.vii.2013), 29 (12.vii.2012)
108. *Melitaea trivia* (Denis & Schiffermüller, 1775) Observations: 15 (10.vii.2012), 16 (23. vii.2013), 21 (25.vii.2013), 23 (22.vii.2013), 27 (25.vii.2013), 30 (12.vii.2012)
109. *Melitaea athalia* (Rottemburg, 1775) Observations: 4 (21.vii.2013), 6 (11.vii.2012), 7 (21. vii.2013), 11 (19.vii.2013), 17 (23.vii.2013), 29 (12.vii.2012)
110. *Melitaea ornata* Christoph, 1893. Observations: 3 (21.vii.2013)
111. *Euphydryas aurinia* (Rottemburg, 1775) Observations: 15 (10.vii.2012)
112. *Melanargia galathea* (Linnaeus, 1758) Observations: 3 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012, 15.vii.2013, 16.vii.2013, 18.vii.2013), 6 (11.vii.2012), 7 (21.vii.2013), 8 (17. vii.2013), 9 (17.vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 13 (10.vii.2012), 14 (10. vii.2012, 22.vii.2013), 15 (10.vii.2012, 22.vii.2013), 16 (22.vii.2013, 23.vii.2013), 17 (23.vii.2013), 19 (23.vii.2013), 21 (21.vii.2013, 25.vii.2013), 22 (22.vii.2013), 23 (22. vii.2013), 24 (20.vii.2013), 28 (20.vii.2013), 29 (12.vii.2012), 30 (12.vii.2012)
113. *Melanargia russiae* (Esper, 1783) Observations: 8 (17.vii.2013, 18.vii.2013), 12 (19. vii.2013), 21 (21.vii.2013, 25.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013)
114. *Melanargia larissa* (Geyer, 1828) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 4 (21. vii.2013), 5 (11.vii.2012, 15.vii.2013, 16.vii.2013, 16.vii.2013, 18.vii.2013), 6 (11. vii.2012), 7 (21.vii.2013), 8 (17.vii.2013, 18.vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 13 (10.vii.2012), 14 (10.vii.2012, 22.vii.2013), 15 (10.vii.2012, 22.vii.2013), 16 (22. vii.2013, 23.vii.2013), 17 (23.vii.2013), 20 (21.vii.2013), 21 (21.vii.2013, 25.vii.2013), 23 (22.vii.2013), 24 (20.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013), 28 (20.vii.2013), 29 (12. vii.2012), 30 (12.vii.2012)
115. *Hipparchia syriaca* (Staudinger, 1871) Observations: 1 (15.vii.2013), 9 (17.vii.2013), 24 (24.vii.2013)
116. *Hipparchia fagi* (Scopoli, 1763) Observations: 2 (21.vii.2013), 5 (16.vii.2013, 18.vii.2013), 8 (17.vii.2013, 18.vii.2013), 15 (22.vii.2013), 16 (23.vii.2013), 26 (24.vii.2013), 27 (25. vii.2013), 27 (20.vii.2013), 29 (12.vii.2012)
117. *Hipparchia senthes* (Fruhstorfer, 1908) Observations: 15 (10.vii.2012), 17 (23.vii.2013), 29 (12.vii.2012)
118. *Hipparchia statilinus* (Hufnagel, 1766) Observations: 16 (22.vii.2013, 23.vii.2013)
119. *Chazara briseis* (Linnaeus, 1764) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 5 (11. vii.2012, 16.vii.2013), 7 (21.vii.2013), 8 (18.vii.2013), 14 (10.vii.2012, 22.vii.2013), 15 (22.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013)
120. *Pseudochazara anthelea* (Hübner, 1824) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 5 (16.vii.2013, 18.vii.2013), 8 (18.vii.2013), 14 (10.vii.2012), 15 (22.vii.2013), 16 (22. vii.2013), 28 (14.vii.2013)
121. *Pseudochazara mniszechii* (Herrich-Schäffer, 1851) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 5 (11.vii.2012, 15.vii.2013, 16.vii.2013, 18.vii.2013), 8 (17.vii.2013, 18.vii.2013), 28 (14. vii.2013)

122. *Pseudochazara amymone* Brown, 1976. Observations: 2 (21.vii.2013), 3 (21.vii.2013), 5 (11.vii.2012, 16.vii.2013, 18.vii.2013), 8 (18.vii.2013), 14 (10.vii.2012, 22.vii.2013), 16 (22.vii.2013, 23.vii.2013)
123. *Satyrus ferula* (Fabricius, 1793) Observations: 2 (21.vii.2013), 5 (11.vii.2012, 16.vii.2013), 8 (17.vii.2013), 16 (23.vii.2013), 21 (21.vii.2013, 25.vii.2013), 26 (24.vii.2013), 27 (25. vii.2013)
124. *Brintesia circe* (Fabricius, 1775) Observations: 1 (15.vii.2013), 3 (21.vii.2013), 4 (21. vii.2013), 5 (11.vii.2012, 16.vii.2013, 18.vii.2013), 6 (11.vii.2012), 7 (21.vii.2013), 8 (17. vii.2013, 18.vii.2013), 9 (17.vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 14 (10.vii.2012, 22.vii.2013), 15 (10.vii.2012, 22.vii.2013), 17 (23.vii.2013), 19 (23.vii.2013), 21 (21. vii.2013), 22 (22.vii.2013), 23 (22.vii.2013), 24 (20.vii.2013), 25 (24.vii.2013), 26 (24. vii.2013), 27 (25.vii.2013), 28 (20.vii.2013), 29 (12.vii.2012)
125. *Arethusana arethusa* (Denis & Schiffermüller, 1775) Observations: 3 (21.vii.2013)
126. *Erebia medusa* (Denis & Schiffermüller, 1775) Observations: 12 (19.vii.2013), 19 (23. vii.2013), 21 (21.vii.2013, 25.vii.2013), 30 (12.vii.2012)
127. *Erebia gorge* (Hübner, 1804) Observations: 21 (21.vii.2013, 25.vii.2013)
128. *Erebia rhodopensis* Nicholl, 1900. Observations: 30 (12.vii.2012)
129. *Erebia ottomana* Herrich-Schäffer, 1847. Observations: 12 (19.vii.2013), 19 (23.vii.2013), 30 (12.vii.2012)
130. *Erebia melas* (Herbst, 1796) Observations: 19 (23.vii.2013), 21 (21.vii.2013, 25.vii.2013), 30 (12.vii.2012)
131. *Maniola jurtina* (Linnaeus, 1758) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 4 (21. vii.2013), 5 (11.vii.2012, 15.vii.2013, 16.vii.2013, 18.vii.2013), 6 (11.vii.2012), 7 (21. vii.2013), 8 (17.vii.2013, 18.vii.2013), 9 (17.vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 13 (10.vii.2012), 14 (10.vii.2012), 15 (10.vii.2012), 16 (22.vii.2013), 17 (23.vii.2013), 18 (23.vii.2013), 21 (21.vii.2013), 23 (22.vii.2013), 24 (20.vii.2013), 25 (24.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013), 28 (20.vii.2013), 29 (12.vii.2012)
132. *Hyponephele lycaon* (Rottemburg, 1775) Observations: 2 (21.vii.2013), 5 (11.vii.2012, 16.vii.2013, 18.vii.2013), 8 (17.vii.2013, 18.vii.2013), 9 (17.vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013), 29 (12.vii.2012)
133. *Hyponephele lupina* (Costa, 1836) Observations: 8 (17.vii.2013)
134. *Aphantopus hyperantus* (Linnaeus, 1758) Observations: 4 (21.vii.2013)
135. *Pyronia tithonus* (Linnaeus, 1767) Observations: 7 (21.vii.2013), 13 (10.vii.2012), 14 (10. vii.2012), 15 (22.vii.2013), 17 (23.vii.2013), 18 (23.vii.2013), 20 (21.vii.2013), 24 (20. vii.2013)
136. *Coenonympha rhodopensis* Elwes, 1900. Observations: 12 (19.vii.2013), 19 (23.vii.2013), 30 (12.vii.2012)
137. *Coenonympha pamphilus* (Linnaeus, 1758) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 5 (11.vii.2012), 7 (21.vii.2013), 10 (17.vii.2013), 11 (19.vii.2013), 13 (10.vii.2012), 14 (10. vii.2012, 22.vii.2013), 15 (10.vii.2012, 22.vii.2013), 22 (22.vii.2013), 23 (22.vii.2013), 24 (20.vii.2013), 25 (24.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013), 28 (20.vii.2013)
138. *Coenonympha arcania* (Linnaeus, 1761) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 4 (21.vii.2013), 5 (11.vii.2012), 6 (11.vii.2012), 8 (17.vii.2013), 10 (17.vii.2013), 11 (19. vii.2013), 12 (19.vii.2013), 16 (22.vii.2013), 17 (23.vii.2013)

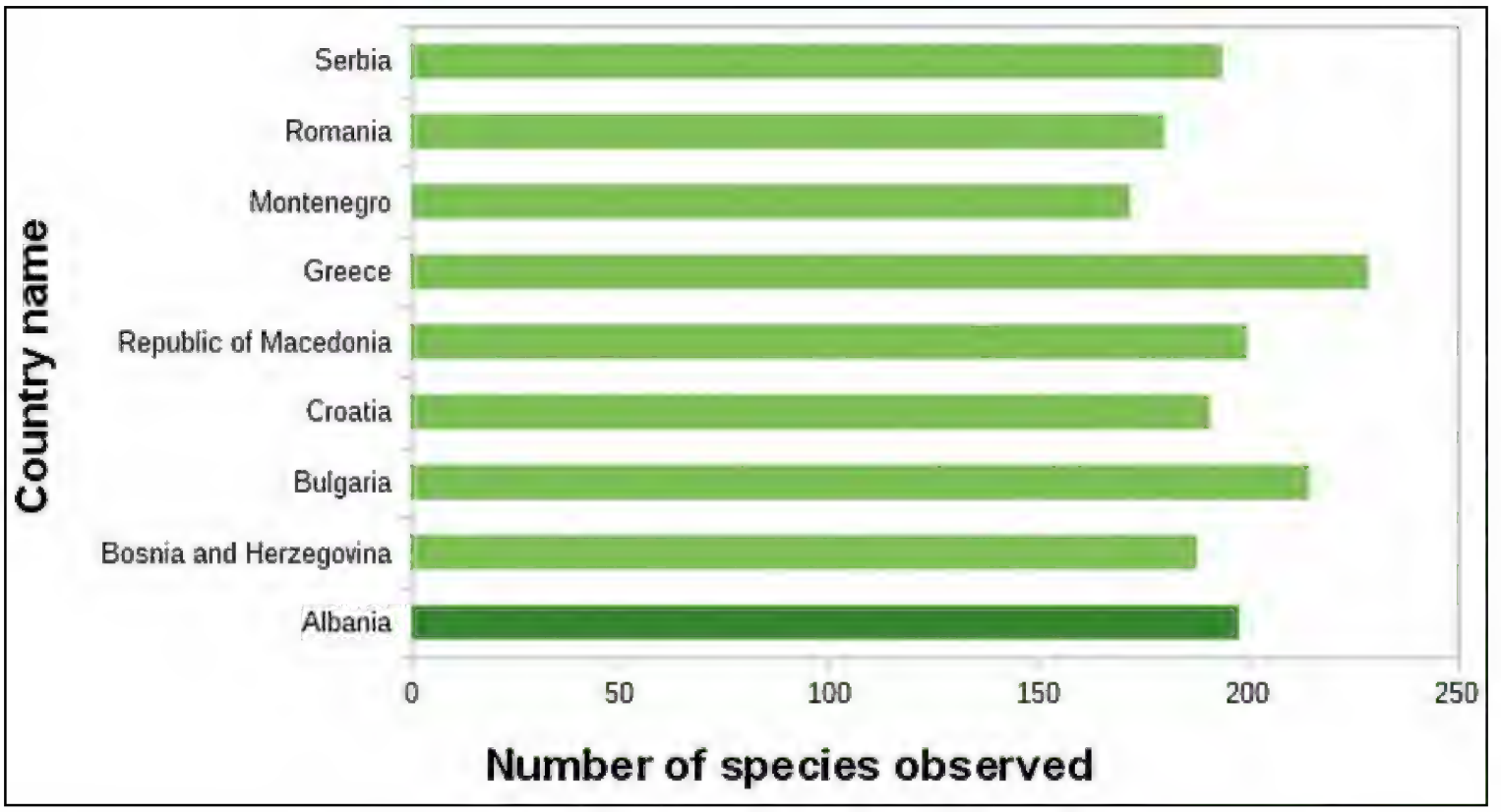

Figure 2. The total number of butterfly species recorded in Albania compared with its neighbouring countries.

139. *Coenonympha orientalis* Rebel, 1910. Observations: 6 (11.vii.2012), 12 (19.vii.2013), 19 (23.vii.2013), 30 (12.vii.2012)
140. *Pararge aegeria* (Linnaeus, 1758) Observations: 2 (21.vii.2013), 4 (21.vii.2013), 7 (21. vii.2013), 18 (23.vii.2013), 27 (25.vii.2013)
141. *Lasiommata megera* (Linnaeus, 1767) Observations: 2 (21.vii.2013), 3 (21.vii.2013), 5 (11. vii.2012, 16.vii.2013, 18.vii.2013), 7 (21.vii.2013), 8 (17.vii.2013, 18.vii.2013), 10 (17. vii.2013), 11 (19.vii.2013), 14 (10.vii.2012, 22.vii.2013), 15 (10.vii.2012, 22.vii.2013), 16 (22.vii.2013, 23.vii.2013), 17 (23.vii.2013), 19 (23.vii.2013), 21 (21.vii.2013, 25.vii.2013), 22 (22.vii.2013), 23 (22.vii.2013), 24 (20.vii.2013), 25 (24.vii.2013),26 (24. vii.2013), 27 (25.vii.2013), 28 (20.vii.2013), 30 (12.vii.2012)
142. *Lasiommata maera* (Linnaeus, 1758) Observations: 2 (21.vii.2013), 6 (11.vii.2012), 15 (10.vii.2012, 22.vii.2013), 16 (22.vii.2013, 23.vii.2013), 17 (23.vii.2013), 21 (21. vii.2013), 23 (22.vii.2013), 25 (24.vii.2013), 26 (24.vii.2013), 27 (25.vii.2013)
143. *Kirinia roxelana* (Cramer, 1777) Observations: 27 (25.vii.2013)

If we include all the published records, the total number of butterfly species recorded in Albania has risen to 198, which equates to 41% of the total European butterfly fauna. Compared with its neighbouring countries (Fig. 2) only Greece (229), and Bulgaria (215) have more recorded species, while other countries have similar diversity.

Discussion

During the two years of field studies in southern Albania, five new species were recorded for the country. *Colias aurorina*, *Apatura iris* and *Pieris balcana* were observed during the first survey in 2012 (Verovnik and Popović 2013b). *Cupido alcetas* and *Melitaea ornata* were added

in 2013. The presence of both species in Albania is not unexpected, although *C. alcetas* is rare in the neighbouring Republic of Macedonia (Schaider and Jakšić 1989) and Greece (Pamperis 2009). This butterfly could be easily overlooked due to its similarity with *C. decoloratus* and *C. argiades*, both of which have previously been recorded from Albania (Rebel and Zerny 1931). As only historical publications are available for reference, misidentifications cannot be excluded. *C. alcetas* is possibly more widespread in Albania as it frequents a variety of habitats (Pamperis 2009) preferring more humid, sheltered or overgrown biotopes along streams or rivers. *M. ornata*, on the other hand, is possibly more widespread in the southern Balkans with several records from the Republic of Macedonia (Verovnik et al. 2010; Verovnik 2012), Serbia (Jakšić 2011) and Croatia (Koren and Štih 2013). However, it is very similar to the more widely distributed *M. phoebe*, and therefore easily overlooked (Tóth et al. 2013). Identification from studying the overwintering larvae of both species is usually required to confirm its presence (Russell et al. 2007; Tóth and Varga 2010).

Additionally, we confirm the presence of *Erebia rhodopensis* in Albania. Our record, from the Gramoz Mts., is the first authenticated record for the country. Its presence in the Gramoz Mts. was not unexpected, as it is common on the Greek side of the same mountain range (Pamperis 2009). The species had previously been reported in Albania from Mt. Kobilica in the Shar Mts. (Rebel and Zerny 1931). However this mountain currently lies on the border between Kosovo and the Republic of Macedonia. There is a possibility that it is also present on the Albanian part of the Shar Mts., further west of Mt. Kobilica.

Among other species that have been recorded one of the most notable is the Balkan endemic *Pseudochazara amymone* which has only recently been discovered in Albania (Eckweiler 2012). Its distribution in Greece still remains unknown, although it has been reported from several sites (Pamperis 2009). Based on our surveys, more detailed information is now available on its distribution, threats (Verovnik et al. 2014), habitat selection, life cycle, morphology and variability (Gascoigne-Pees et al. 2014; Cuvelier and Mølgaard 2015).

In addition to those discovered by Verovnik and Popović (2013b), two other colonies of *Colias aurorina* were discovered in 2013 on calcareous ridges east of Gjirokaster on Mt. Nemëçkë (Loc. 26) and Mt. Lunxhërisë (Loc. 27), extending the known range of this species in Albania by 50 kilometres to the west.

Albania has a similar number of species in comparison to its neighbours (Fig. 2), highlighting the importance of this region for butterfly conservation. The additional number of butterfly species recorded in Greece and Bulgaria can be explained by the fact that more faunistic surveys have been carried out in these countries and they both have a much larger surface area. Greece, in particular, supports many local species found only on its offshore islands close to mainland Turkey, and these species are absent from the rest of Europe (Pamperis 2009). More detailed and well organized surveys in Albania should certainly result in a more complete list of butterflies for this country.

In particular, the mountains in the northern part of the country which experience a more continental climate may harbour some additional species such as *Leptidea juvernica* (Williams, 1946), *Neptis sappho* (Pallas, 1771), *Limenitis populi* (Linnaeus, 1758), *Limenitis camilla* (Linnaeus, 1764), *Melitaea diamina* (Lang, 1789), *Melitaea arduinna* (Esper, 1783), *Nymphalis vaualbum* (Denis & Schiffermüller, 1775), and *Minois dryas* (Scopoli, 1763), whilst higher up in the mountains *Plebejus optilete* (Knoch, 1781), *Erebia alberganus* (De Prunner, 1798) and *Pyrgus androme-*

dae (Wallengren, 1853) could also be discovered. Additionally, early spring surveys of the gorges in the eastern part of the country could provide new records, potentially of *Anthocharis damone* (Boisduval, 1836), *Euchloe pennia* (Freyer, 1852) and *Pseudophilotes bavius* (Eversmann, 1832).

As traditional low intensity farming is economically non-profitable, many parts of the Balkan Peninsula have suffered from rural depopulation resulting in an aging population. Abandonment of rural communities has resulted in the breakdown of traditional agricultural practices (Karoglan Todorović 2013), especially low intensity cattle farming. Historically, traditional grazing and mowing have created semi natural habitats supporting a diversity of species including butterflies. Abandonment of agriculture and the decline in the number of livestock has resulted in the shrinking of species-rich grasslands and, consequently, biodiversity loss (van Swaay et al. 2012). However, the situation in Albania is complex. Statistically, Albanian rural communities are characterized by large number of small farms and the smallest average farm and plot size of all the Balkan countries (Kazakova and Stefanova 2010). Modernisation of agricultural practices has not been implemented, especially in the mountainous parts of the country, where traditional cattle grazing is still carried out. However, Albania is now open to the agricultural practices adopted by other European countries and it is only a matter of time before changes will take place, resulting in the loss of the preserved mosaic of habitats. Urgent measures regarding nature conservation in Albania are therefore needed as neglecting the situation would almost certainly lead to a dramatic reduction of its native fauna and flora.

It is of paramount importance to complete the faunal list and to initiate nature conservation guidelines, especially when adopting new agricultural policies. With respect to butterflies, results from faunistic surveys would help pave the way for new initiatives regarding butterfly conservation with the prospect of implementing a network of Prime Butterfly Areas (PBAs; see van Swaay and Warren 2003) . Mali i Moravës, Gramoz (Mali i Gramozit), Devoll River Gorge, Mt. Tomorri and areas on Mt. Nemercke are among top candidates for PBAs, but there are many more areas to be identified. We hope that this contribution will stimulate more people to study the rich flora and fauna of Albania.

Acknowledgements

We wish to express our thanks to Heribert Hanisch for his additional records of *I. iolas* and *P. mniszechii*. Funding for the initial survey in 2012 was in part provided by the Mohamed bin Zayed Species Conservation Fund.

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